

Early Experiences in the Management of Traumatic Spinal Injuries at a Level 1 Trauma Center in India During the COVID-19 Pandemic

Kamran M. Farooque, Tushar R. Nayak¹, Burhan S. Siamwala¹, Aayush Aryal¹

Department of Orthopaedics, JPN Apex Trauma Centre, New Delhi, ¹Department of Orthopaedics, All India Institute of Medical Sciences, New Delhi, India

Abstract

Context: Overwhelmed by COVID-19 patients requiring urgent medical attention and intensive care beds, majority of our medical resources are allocated for the management of the current pandemic. Other urgent cases requiring surgical attention also need to be optimally addressed. **Aims:** The aim of this article is to report the early results and organizational protocol in the management of traumatic spinal fractures at a level-1 trauma center during the current pandemic. **Settings and Design:** This is a retrospective study of patients with vertebral fractures operated by a single surgeon between April and October 2020. All patients were tested for the SARS-CoV-2 virus, and the tests were repeated every 72 h. We modified our institutional protocol to aid the early management of emergency traumatic spine cases during this pandemic. Descriptive analysis of data collected from hospital records was carried out using Statistical Package for Social Sciences, Virginia, USA, Version 20. **Results:** A total of 44 patients were operated. Burst fracture was the most common fracture with a fall from height being the most common mechanism of injury. Two patients tested positive for the novel corona virus. There were no complications and none of the healthcare staff involved in the patient care or patients reported symptoms of COVID-19 during a 30-day follow-up period. **Conclusion:** Surgical treatment of patients with vertebral fractures, with strict adherence to personal protective measures and local guidelines, did not increase the risk of contracting SARS-CoV2 to either healthcare workers or patients during the lockdown period.

Keywords: COVID-19, institutional protocol, lockdown, pandemic, traumatic spine injuries, vertebral fractures

INTRODUCTION

The COVID-19 pandemic has mounted unprecedented challenges on healthcare services and influenced orthopedic practices worldwide. On January 30, 2020, India confirmed its first case of COVID-19,^[1] and with a subsequent rise in cases, the government announced a 21-day nationwide lockdown from the midnight of 24th March 2020.^[2] The lockdown was extended a further three times and finally, the staging-down was started from 1st June, barring “containment zones,” with plans to unlock in phases.^[3] India currently has the largest number of

confirmed cases in Asia and has the second-highest number of COVID-19 cases in the world.^[4]

Due to travel restrictions, a ban on public and religious gatherings, and sporting events, there is a significant drop in referrals to the orthopedic emergency trauma in the tertiary care centers around the world.^[5-7] Like elsewhere around the globe, elective surgeries were deferred, and life-saving procedures were to be performed under strict adherence to local protocol. The Indian Orthopaedic Association (IOA) issued guidelines for delivering emergency orthopedic and

Address for correspondence: Dr. Tushar R. Nayak,
Department of Orthopaedics, All India Institute of Medical Sciences,
New Delhi 110029, India.
E-mail: orthodrtushar@gmail.com

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trauma care during the outbreak, with trauma services being adapted with non-operative management where possible, teleconsultations, and virtual fracture clinics.^[8] Yet, a delay in the management of vertebral fractures can compound morbidity and diminish the chances for neurological recovery.^[9,10]

As a tertiary trauma referral center, we provided uninterrupted orthopedic trauma services during the lockdown period. The major concerns included:

- A) Pragmatic and ethical distribution of resources during the pandemic;
- B) Safety of healthcare workers (HCWs) and patients from the COVID-19 infection;

- C) Providing optimal patient care, despite several restrictions.

This study evaluates patients with vertebral fractures during the pandemic. We describe the institutional protocol for the management of such fractures, which allows a reduction in hospital stay and decreases the chances of the COVID-19 dissemination.

SUBJECTS AND METHODS

The study was conducted at a tertiary care level-1 trauma center while lockdown was in effect from March 24, 2020. Patients with a traumatic spine fracture operated between April and October 2020 by a single surgeon

DEPARTMENT OF ORTHOPEDICS		
[REDACTED]		
COVID 19 SCREENING CHECKLIST		
NAME:		
ADDRESS:	AGE / SEX:	
PHONE NUMBER:	FAMILY MEMBERS:	
HISTORY:		
SYMPTOMS(ACUTE ONSET, <14 D)	YES	NO
FEVER		
DRY COUGH		
SORE THROAT		
BREATHLESSNESS		
RHINORRHEA		
MALaise/BODYACHE/FATIGUE		
PAIN ABDOMEN/DIARRHOEA		
H/O FOREIGN COUNTRY VISIT		
H/O COVID+ CONTACT		
H/O TRAVEL TO HOTSPOTS		
CO		
MORBID(DM/HTN/COPD/CLD/CKD/MALIGNANCY/IMMUNOSUPPRESIVE STATE/DRUGS		
H/O SIMILAR SYMPTOMS IN FAMILY MEMBERS/CLOSE CONTACT		
EXAMINATION and investigations:		
	RED FLAGS	
HEART RATE	<60/MIN >100/MIN	
BLOOD PRESSURE	<90/60 mmhg	
RESPIRATORY RATE	>24/min	
OXYGEN SATURATION(SPO2)	<94%	
SHOCK INDEX(hr/sbp)	>1	
NCCT CHEST	Any Abnormality	
CHEST X RAY	Any Abnormality	
COVID Testing(if any)	Positive	

Figure 1: Checklist used for screening patients and their attendants during the lockdown

were retrospectively reviewed. Data regarding patient demographics, fracture characteristics, and intraoperative details were retrospectively collected from the medical record section.

Institutional considerations

Due to a rapid surge in COVID-19 cases, the existing trauma center was converted to a dedicated COVID-19 care facility. The trauma care facility was shifted to the main hospital block. At the emergency department, all patients and their attendants were methodically screened for COVID-19 symptoms via a safety checklist [Figure 1]. If asymptomatic, the patients were treated at the working zone. All HCWs followed the personal protective equipment (PPE) protocols as per institutional guidelines. In patients with a suspected spinal trauma, the initial resuscitation was performed as per Advanced Trauma Life Support protocol. The neurological status was assessed using the ASIA impairment scale (AIS). As a part of the routine trauma work-up, plain radiographs and non-contrast computed tomography scans were performed with the COVID-19 risk factors mentioned on the radiology forms. For safety of healthcare professionals and other patients, COVID-19 testing was done for all patients requiring admission [either real-time polymerase chain reaction (RT-PCR) or cartridge-based nucleic acid amplification test (CBNAAT) of nasopharyngeal and oropharyngeal swabs]. Patients with symptoms or signs suggestive of COVID-19 were isolated at a designated “GREY” area, until the COVID status was established. Any patient with a negative report for COVID-19 of greater than 72 h was retested at the Emergency Department.

Once the COVID-negative status was established, the patients were admitted, and surgery was scheduled at the earliest. The criteria for surgical intervention were defined as follows^[11]:

- 1) Cervical displacement (any AIS): urgent early <12 h;
- 2) Worsening of AIS: urgent early <12 h;
- 3) Any level AIS B, C, D: urgent <24–48 h;
- 4) Spinal cord injury with previous cervical spondylosis: urgent <36–48 h
- 5) Any level AIS A-E stable: planned <72–96 h.

Descriptive analysis of data collected from hospital records was analyzed using Statistical Package for Social Sciences, Virginia, USA, Version 20.

RESULTS

The baseline demographic characteristics are as demonstrated in Table 1. The most common type of injury was a burst fracture. The most common mechanism of injury was fall from a height. The distribution of the various injuries is as shown in Table 1. The most commonly affected region of the

spine was thoracolumbar followed by thoracic and then lumbar spine [Figure 2].

The American Society of Anaesthesiologists (ASA) grades, intraoperative blood loss, and duration of procedures are as mentioned in Table 2. All but two patients were negative for COVID-19 infection and no patient developed signs and symptoms suggestive of COVID-19 within the 30 days follow-up period. The COVID-19-positive patients (two) were referred to the dedicated COVID care facility and operated once COVID-negative. One of the patients was AISA A and the other was ASIA B, neither of them showed any change in the neurological status on testing negative. None of the members of the surgical/anesthesia team and healthcare staff involved in the management of the patients reported with symptoms of COVID-19 during the 30-day

Table 1: Demographic and injury characteristics

Variable	Values
Age (years), mean	30.55
Sex ratio (male: female)	32:12
Diagnosis	
• Burst fracture	25
• Chance fracture	11
• Flexion-distraction	4
• Translation	2
• Traumatic listhesis	1
• Teardrop	1
Mode of injury	
• Fall from height	30
• RTA	10
• Fall from stairs	4

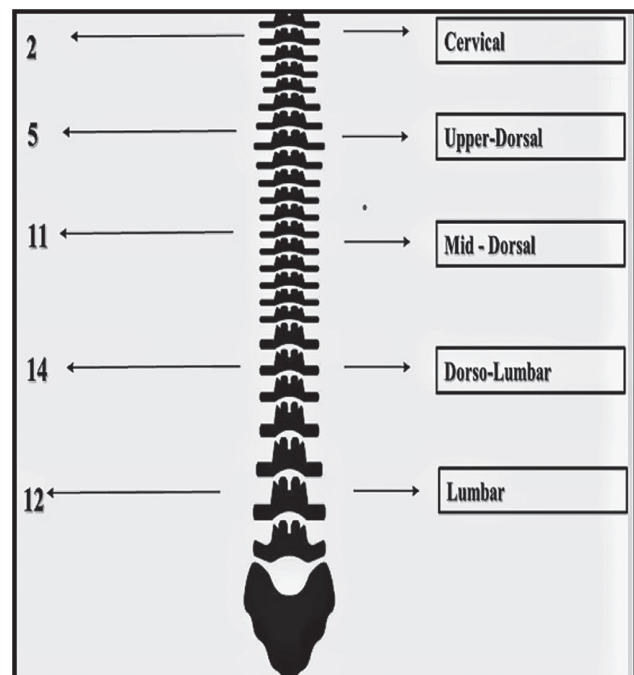


Figure 2: Regions of the spine affected

follow-up period from the date of surgery. No complications were reported in any of the patients in the immediate 1-month follow-up period post-surgery.

DISCUSSION

Patient care during the COVID-19 pandemic is fraught with the perils of disease transmission to both HCWs and patients. This is a deterrent to appropriate decision-making in patient care. Guo *et al.*^[12] reported the outcomes of 24 orthopedic surgeons infected by the novel coronavirus from eight Wuhan hospitals. The commonly suspected site of infection was either general wards (79.2%) or public places (20.8%) visited by respondents with only 12.5% of respondents suspecting infection exposure from operating rooms. Transmission from these doctors took place most commonly among their family members (20.8%). Nevertheless, delaying surgery can significantly increase the risk of worsening or lack of improvement of the neurological deficits associated with the fractures.

Challenges faced during spinal surgery

The main challenge was to ensure the safety of the HCWs and patients admitted in the wards. Priority was given to the ergonomic allocation of resources for peri-operative care, including ICU beds and ventilators. Due to the cancellation of scheduled blood donation camps, the accessibility to blood products was a challenge. Arranging spine implants with transportation restrictions was difficult during the early lockdown periods. As the lockdown restrictions eased out, the transport situation gradually improved and was near normal during the 4th month following the announcement of the lockdown.

Variable	Values
ASA* grade	
• Grade 1	28
• Grade 2	8
• Grade 3	8
• Grade 4	0
Estimated blood (mL), median (IQR**)	375 (250–600)
Duration of surgery (min), median (IQR)	130 (90–180)
Duration from admission to surgery (days), median (IQR)	2 (1–4)
Duration from admission to discharge (days), median (IQR)	7 (6–9)
Anesthetic method	
• General	40
• Regional	4
Complications	None

*ASA = American Society of Anesthesiologists; **IQR = interquartile range

Modifications of our management protocol during the pandemic

Irrespective of the contact or travel history and symptoms, all patients before being admitted in the wards underwent a CBNAAT/RT-PCR-based COVID-19 test. All patients were observed in the emergency department and shifted to the wards, only after a negative test. Two of the forty-four cases, who had initially tested COVID-positive, were referred to the designated COVID center for further care. Once the two patients tested COVID-19-negative, the patients were shifted back and operated upon [Figure 3].

After initial screening for the indications for surgery, evaluation of risk factors, predicted operative course, and requirements of hospital resources were assessed. These comprised ICU bed requirements, need for blood and blood products, consultations from allied departments, and duration of hospital stay. The scheduling of surgery was based on the current recommendations and guidelines.^[13,14] The surgeries were performed sooner than the 72–96-h proposed period.

Anesthetists are among the healthcare workers at the highest risk of exposure.^[15] All pre-anesthetic evaluations were performed following a COVID-19-negative report. On the day of surgery, reassessment was done to look for COVID-19 risk factors. As a part of institutional policy, all COVID reports were valid only for a period of 72 h. If the 72-h period was exceeded, a repeat test was performed. To reduce the risk of transmission in operating rooms, the senior-most anesthetist performed intubation,^[16] and

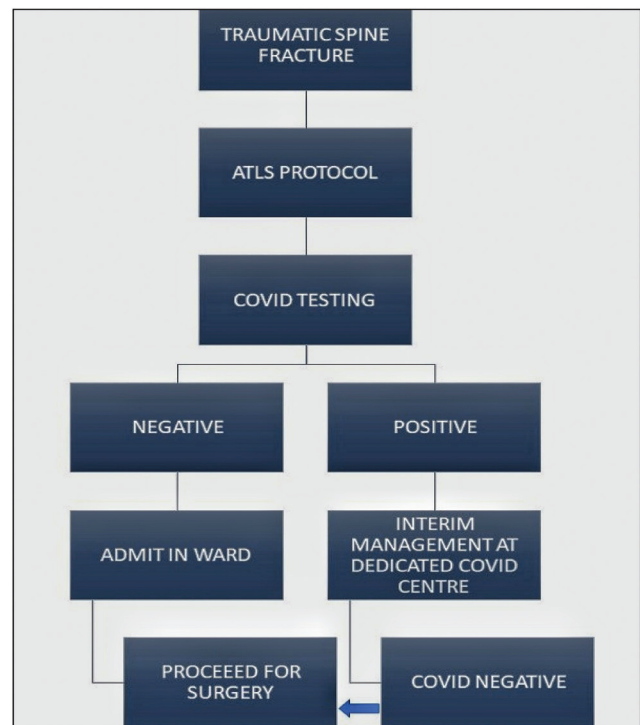


Figure 3: Organizational flowchart for the management of traumatic spinal injuries

the operating team of surgeons stayed away during the induction, intubation, and extubation.

Routinely performed procedures such as open suctioning, smoke-generating procedures (mono/bipolar diathermy), and opening of pressurized cavities are considered as high risk for COVID transmission.^[17] Pulse lavage irrigation of the wound during surgery was avoided to reduce aerosol generation. Nevertheless, electrocautery had to be used, albeit minimally to minimize intraoperative blood loss. As for the above reasons, minimally invasive surgeries were preferred over open surgeries wherever possible (9 out of 44 cases). As there is a possibility of a change in COVID status during admission, viral screening was repeated after 72 h of admission, with close attention to possible symptoms. Consultant-led patient review was performed daily, with the extension of imaging to include chest screening when needed.

There was a reduction in the number of orthopedic spine surgeries performed during the first five months after the lockdown. The difference was largely due to (1) reduced presentation of spine trauma patients in the emergency department due to the lockdown restrictions and (2) conservative management of the cases which had borderline operative indications. Any procedure that was considered “semi-elective,” such as those for acute traumatic lumbar disc herniations without neurological deficit, was avoided on the first instance, and patients were advised conservative management. However, as ours is a tertiary referral center, catering to patients from different parts of our country, we had a substantial load of spine trauma cases.

Apart from routine hospital visits for a wound check, teleconsultation services were also provided to our patients. All patients had a minimum follow-up of 30 days following surgery. Initially, patients were followed up at the emergency department, and once the OPDs were functioning, patients were followed up at the OPDs. During the follow-up, apart from the routine examination, each patient was specifically asked for symptomatic evidence of COVID-19. None of them reported any such symptoms.

This is a preliminary report on the management of traumatic spine injuries, and therefore it is not free of limitations. One of the limitations of the study is long-term follow-up data on outcomes of surgery and survival or COVID-associated complications of patients were not available due to the study period. Our protocol of management would need further validation over time.

CONCLUSION

Surgical treatment of patients with vertebral fractures, with strict adherence to personal protective measures and local guidelines, did not increase the risk of contracting SARS-CoV2 to either HCWs or patients during the lockdown period. The management algorithm reduced

the hospitalization period by maximizing the healthcare resources available and simultaneously reducing COVID spread.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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